

Weather Planning Criteria and Adjustment

Weather planning criteria and weather-adjustment procedures provide a foundation for substation load analysis and forecasting. Consistent criteria and a corresponding adjustment procedure significantly simplify year-to-year substation load comparisons allowing identification of underlying growth trends that are critical to accurate forecasts and appropriate and justified system expansion plans.

Weather Planning Criteria

Substation forecasts must account for extreme weather conditions to ensure the system plan will provide the capacity necessary to deliver power under weather conditions that can reasonably be expected. Planning for “average” or “50/50” weather conditions is insufficient since they imply that the conditions are exceeded every other year, resulting in clearly unacceptable risks. However, the choice between one-in-five, one-in-eight, one-in-ten or other criteria can be difficult without proper methods of assessing the frequency at which the system might be at risk.

Plots of the occurrence frequency for various weather conditions provide insight into how often and by what magnitude different weather condition thresholds are exceeded. An example of such a plot is shown below.

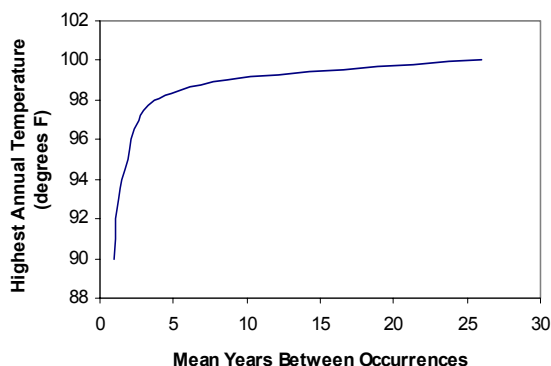


Figure 1- Weather Frequency of Occurrence

Analysis of the frequency and magnitude by which different weather conditions are exceeded is combined with analysis of load sensitivity to weather conditions to provide a measure of the degree of risk associated with different weather criteria. These analyses allow documented and defensible weather criteria to be selected.

Weather Adjustment

Once criteria are established, a consistent method of adjusting metered data is necessary for normalization to the defined criteria. Adjustment is typically based on regression analyses of substation loads and weather variables. Figure 2 shows a “real world” example of the impact of weather adjustment on actual data.

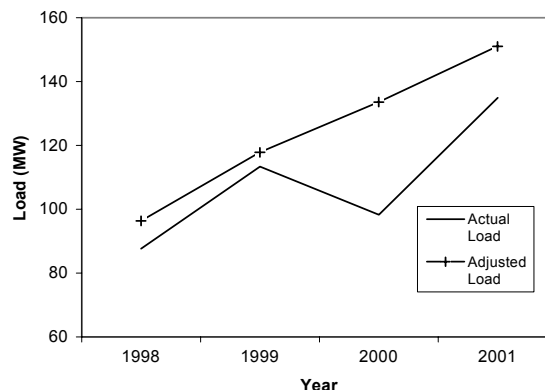


Figure 2 - Example Weather Adjustment

The data corresponding with Figure 2 are shown in Table 1.

Table 1- Example Weather Adjustment

	1998	1999	2000	2001
Actual Load (MW)	87.6	113.4	98.3	134.9
Adjustment Factor	1.10	1.04	1.36	1.12
Adjusted Load (MW)	96.4	117.9	133.7	151.1

Development of a weather adjustment procedure involves screening a variety of model formats to assess appropriateness across a variety of conditions. Complex relationships between weather and load can be addressed through nonlinear models or piecewise linear representations. Once a format is chosen, specific models can be developed for each substation for the years in question and adjustment factors calculated. Adjustment factors are then applied to the metered data to provide normalized load levels that can be used for forecasting and system planning

Weather criteria and associated adjustment are critical for providing a justifiable and defensible foundation for transmission and distribution planning.